

# Multigrid optimization for space-time discontinuous Galerkin discretizations

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Space-time discontinuous Galerkin discretizations of partial differential equations result in large systems of algebraic equations that need to be solved at each time-step. To efficiently solve these algebraic equations, we combine a pseudo-time integration method with new  $h$ -multigrid techniques using explicit Runge-Kutta type time integrators as smoother. A two- and three-level Fourier analysis is used to investigate and optimize the multigrid algorithm for second, third and fourth order space-time discontinuous Galerkin discretizations of the two-dimensional linearized Euler equations. We will compare our optimized schemes with current pseudo-time Runge-Kutta time integrators.

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